Claims:

1. A process for the preparation of an olefin homopolymer or copolymer comprising polymerising at least one C_{2-20}-α-olefin in slurry phase in the presence of

1) a metallocene compound of formula I:

$$(Cp)(Cp")R_nMX_2 \qquad (I)$$

wherein:

Cp is an optionally substituted and/or optionally fused homo- or heterocyclopentadienyl ligand;

Cp" is a cyclopentadienyl substituted by at least one C_{1-20}-alkyl group;

R is a bridge of 1-7 bridging atoms;

M is a group 4 to 6 transition metal;

each X is $-CH_2-Y$, wherein Y is C_{6-20}-aryl, C_{6-20}-heteroaryl, C_{1-20}-alkoxy, C_{6-20}-aryloxy, $-NR'_2$, $-SR'$, $-PR'_3$, $-SiR'_3$, $-OSiR'_3$ or halogen;

R' is C_{1-20}-hydrocarbyl or in case of $-NR'_2$, the two substituents R' can form a ring together with the nitrogen atom wherein they are attached to;

and each non-cyclopentadienyl ring moiety can further be substituted;

n is 0 or 1; and

(II) an aluminoxane.

2. A process as claimed in claim 1 wherein n is 0.

3. A process as claimed in claim 1 or 2 wherein Cp is optionally substituted by halogen, C_{1-20}-alkyl, C_{2-20}-alkenyl, C_{2-20}-alkynyl, C_{3-12}-cycloalkyl, C_{6-20}-aryl or C_{7-20}-arylalkyl, C_{3-12}-heterocycloalkyl which contains 1, 2, 3 or 4 heteroatom(s) in the ring moiety, C_{5-20}-heteroaryl,

C_{1-20}-haloalkyl, -SiR"$_3$, -OSiR"$_3$, -SR", -PR"$_2$ or -NR"$_2$.

4. A process as claimed in any one of claims 1 to 3 wherein Cp denotes optionally substituted cyclopentadienyl, indenyl, tetrahydroindenyl, benzindenyl or fluorenyl.

5. A process as claimed in claim 4 wherein Cp denotes optionally substituted cyclopentadienyl.

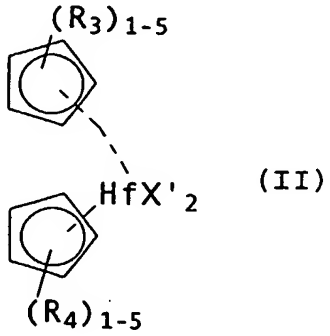
6. A process as claimed in claim 6 wherein the Cp and Cp" groups are identical.

7. A process as claimed in any one of claims 2 to 7 wherein the Cp and Cp" groups carry 1 to 5 C_{1-6}-alkyl substituents.

8. A process as claimed in claim 1 to 7 wherein M is Hf.

9. A process as claimed in any one of claims 1 to 8 wherein -CH_2-Y is benzyl or -CH_2-SiR'$_3$.

10. A process as claimed in claims 1 wherein said metallocene is of formula (II)



(II)

wherein R_3 is a C_{1-6}-alkyl or siloxy substituent, R_4 is a C_{1-6}-alkyl, and both X' groups are either benzyl (Bz) or

$CH_2SiR'_3$ wherein R' is C_{1-20}-hydrocarbyl.

11. A process as claimed in any one of claims 1 to 10 wherein said slurry phase is carried out in a loop reactor.

12. A process as claimed in any one of claims 1 to 11 wherein said slurry phase polymerisation is one stage of a multistage polymerisation.

13. A process as claimed in claim 12 wherein subsequent to said slurry phase polymerisation there is a gas phase polymerisation.

14. A process as claimed in claim 13 wherein the weight ratio of produced polymer in the slurry phase: gas phase is 60:40 to 40:60.

15. A process as claimed in claim 13 or 14 wherein said polymerisation consists of two stages, a slurry phase and a gas phase stage.

16. A process as claimed in claim 13 wherein said gas phase polymerization is itself followed by a further gas phase polymerisation stage.

17. A process as claimed in any one of claims 1 to 16 wherein the metallocene is prepolymerised.

18. A process as claimed in any one of claims 1 to 17 wherein said olefin homopolymer or copolymer is an ethylene homopolymer or ethylene copolymer with a C_{3-6}-comonomer.

19. A process as claimed in any one of claims 1 to 18 wherein said metallocene is supported on a carrier.

20. Metallocene compounds of formula (III)

$Cp'_2HfX^1_2$ (III)

wherein each Cp' denotes a mono or di C_{1-6}-alkyl-substituted cyclopentadienyl, X^1 is benzyl or $CH_2SiR'_3$ in which R' is C_{1-20}-hydrocarbyl.

21. A process as claimed in claim 20 wherein R' is methyl.

22. The metallocene compounds:

bis(n-butylcyclopentadienyl)Hf dibenzyl,
bis(methylcyclopentadienyl)Hf dibenzyl,
bis(1,2-dimethylcyclopentadienyl)Hf dibenzyl,
bis(n-butylindenyl) Hf dibenzyl,
bis(methylindenyl) Hf dibenzyl,
bis(dimethylindenyl) Hf dibenzyl,
bis(n-propylcyclopentadienyl)Hf dibenzyl,
bis(i-propylcyclopentadienyl)Hf dibenzyl,
bis(n-butylcyclopentadienyl) Hf $(CH_2SiMe_3)_2$,
bis(n-propylcyclopentadienyl) Hf $(CH_2SiMe_3)_2$,
bis(i-propylcyclopentadienyl) Hf $(CH_2SiMe_3)_2$.

23. An olefin produced by a process as claimed in any one of claims 1 to 19.